

## SEQUENCE LISTING

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<120> Isolation and Cloning of DNA from Uncultivated Organisms

<130> G1184 PCT

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<151> 2002-08-20

<160> 35

<170> PatentIn version 3.1

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Asp Ser Gln Ile Tyr Phe Trp Ser Glu Ser Phe Ile Glu Asn His Ile  
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 ccttttgtaa aaacatgcat aatgagtgat tgcggtcatg tgccttttgt tgaaaagcct 840  
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<210> 5

<211> 293

<212> PRT

<213> Crenarchaeote

<400> 5

Met Asp Ile Asp His Lys Ile Leu Val Tyr Phe Ile Leu Ser Ile Asn  
1 5 10 15

Lys Ile Ile Ile Thr Met Gly Leu Val Ser Asp Arg Gln Arg Asn Glu  
20 25 30

Thr Met Asp Phe Ile Lys Ile Leu Gly Tyr Asn Ile Arg Tyr Ile Lys  
35 40 45

Ile Asp Gln Val Lys Ser Asn Glu Thr Ile Ile Leu Leu His Gly Ile  
50 55 60

Gly Ala Ser Ala Glu Arg Trp Ser Glu Leu Val Pro Phe Leu Tyr Asn  
65 70 75 80

Cys Asn Ile Ile Ile Pro Asp Ile Ile Gly Phe Gly Tyr Ser Glu Lys  
85 90 95

Pro Arg Ile Glu Tyr Asn Ile Asp Leu Phe Val Lys Phe Leu Asp Glu  
100 105 110

Leu Phe Leu Lys Leu Glu Ile Lys Asn Pro Ile Ile Met Gly Ser Ser  
115 120 125

Phe Gly Gly Gln Leu Ile Leu Glu Tyr Tyr Phe Arg His Lys Asp Phe  
130 135 140

Phe Lys Lys Met Ile Leu Val Ser Pro Ala Gly Thr Gln Glu Arg Pro  
145 150 155 160

Thr Leu Ala Leu Arg Gln Tyr Thr Tyr Ser Cys Leu Tyr Pro Thr Arg  
165 170 175

Glu Asn Thr Glu Arg Ala Phe Lys Met Met Ser His Phe Asn His Thr  
180 185 190

Val Lys Asp Ser Met Ile Lys Asp Phe Ile Asn Arg Met Lys Gln Pro  
195 200 205

Asn Ala Lys His Ser Phe Val Ser Thr Leu Leu Ala Leu Arg Lys Asn  
210 215 220

Ser Asp Leu Gln Asp Asn Leu Arg Glu Ile Lys Ile Pro Thr Leu Val  
225 230 235 240

Ile Trp Gly Lys Glu Asp Asn Thr Ile Pro Val Glu Asn Ile Glu Tyr  
245 250 255

Phe Arg Gly Ile Pro Phe Val Lys Thr Cys Ile Met Ser Asp Cys Gly  
260 265 270

His Val Pro Phe Val Glu Lys Pro Leu Glu Phe Tyr Lys Ile Val Lys  
275 280 285

Glu Phe Ile Asp Ser  
290

<210> 6

<211> 318

<212> DNA

<213> Crenarchaeote

<400> 6

ttgaatcaat ccacttctat gagtaatgag aatgaagaaa ataaagatat agatttttaag 60

aatccattg aaaaggctgc ggaattccag caggatttgt tgcgacagtt ctctacaatt 120

caatacaatg cgtttcagaa tatgttttca tctttgcaag gatttacaaa ttataatgcc 180

atgttttaaaa ccaccgtaca gacgggtggc aggatctcaa ttcccgaagc agaaagaaat 240  
 gctttgggga ttgaagaggg tgatctagtc caggttataa ttataccggt gacaaggaaa 300  
 aagaaaaaca caagttaa 318

<210> 7

<211> 105

<212> PRT

<213> Crenarchaeote

<400> 7

Met Asn Gln Ser Thr Ser Met Ser Asn Glu Asn Glu Glu Asn Lys Asp  
 1 5 10 15

Ile Asp Phe Lys Lys Ser Ile Glu Lys Ala Ala Glu Phe Gln Gln Asp  
 20 25 30

Leu Leu Arg Gln Phe Ser Thr Ile Gln Tyr Asn Ala Phe Gln Asn Met  
 35 40 45

Phe Ser Ser Leu Gln Gly Phe Thr Asn Tyr Asn Ala Met Phe Lys Thr  
 50 55 60

Thr Val Gln Thr Gly Gly Arg Ile Ser Ile Pro Glu Ala Glu Arg Asn  
 65 70 75 80

Ala Leu Gly Ile Glu Glu Gly Asp Leu Val Gln Val Ile Ile Ile Pro  
 85 90 95

Leu Thr Arg Lys Lys Lys Asn Thr Ser  
 100 105

<210> 8

<211> 1086

<212> DNA

<213> Crenarchaeote

<400> 8

atgagaaaaa aaatgaataa ttccttaatt aattatttag tgaatgatta ttttacgttt 60

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gaaaacataa agactggatc aagcgaatat gaggtaataa gggaaacaac cctcttccgt 180
ttactacatt ataaaccctt aaagcaacaa actttcaagt accotttggt gattgtttat 240
gcattaataa acaaatcata tattttggat ctgcagaacg acaaaagttg gataaggaac 300
ctgctagagc agggcataaa tgtctatctg attgactgga aacccccgtc aaaactggat 360
aaatacatca ctgttgatga ttatgtcaat ttgtttattt atgagtgtgt agaatacata 420
aaaaacatag aaaacattga tcagatttca ttacaaggat attgcatggg ggttacaatg 480
tccttgatgt acacttcgct atatcaaaaa aacattaaaa atctagtcac cattgctcca 540
attgttgatg ccgagaaaga caaatccgta ataaaaaaca tggctgagca catggatatt 600
gacaaagtac tgtcctatca cgaaaacttt ccatatgaat tactgtatct ggtttatgca 660
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attgcggggg aaacctttag gcaatgggta aaggatatct atcagcaaaa cttttttgca 840
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cttaatggtg tagctgaatt tgaccacctt gtaacgtctg acagcagtag ctccctaaac 960
aacctaattt caagtcagga taaaagcctg atgaaatttc caacagggca tgtagggcta 1020
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cattaa 1086

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&lt;210&gt; 9

&lt;211&gt; 361

&lt;212&gt; PRT

&lt;213&gt; Crenarchaeote

&lt;400&gt; 9

```

Met Arg Lys Lys Met Asn Asn Ser Leu Ile Asn Tyr Leu Val Asn Asp
1           5           10          15

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```

Tyr Phe Thr Phe Val Arg Asp Pro Asp Asn Ile Ser Lys Leu Lys Glu
20           25          30

```

```

Ile Arg Lys Lys Leu Ser Asn Ile Glu Asn Ile Lys Thr Gly Ser Ser
35           40          45

```

Glu Tyr Glu Val Ile Arg Glu Thr Thr Leu Phe Arg Leu Leu His Tyr  
50 55 60

Lys Pro Leu Lys Gln Gln Thr Phe Lys Tyr Pro Leu Leu Ile Val Tyr  
65 70 75 80

Ala Leu Ile Asn Lys Ser Tyr Ile Leu Asp Leu Gln Asn Asp Lys Ser  
85 90 95

Trp Ile Arg Asn Leu Leu Glu Gln Gly Ile Asn Val Tyr Leu Ile Asp  
100 105 110

Trp Lys Pro Pro Ser Lys Leu Asp Lys Tyr Ile Thr Val Asp Asp Tyr  
115 120 125

Val Asn Leu Phe Ile Tyr Glu Cys Val Glu Tyr Ile Lys Asn Ile Glu  
130 135 140

Asn Ile Asp Gln Ile Ser Leu Gln Gly Tyr Cys Met Gly Gly Thr Met  
145 150 155 160

Ser Leu Met Tyr Thr Ser Leu Tyr Gln Lys Asn Ile Lys Asn Leu Val  
165 170 175

Thr Ile Ala Pro Ile Val Asp Ala Glu Lys Asp Lys Ser Val Ile Lys  
180 185 190

Asn Met Ala Glu His Met Asp Ile Asp Lys Val Leu Ser Tyr His Glu  
195 200 205

Asn Phe Pro Tyr Glu Leu Leu Tyr Leu Val Tyr Ala Ser Leu Lys Pro  
210 215 220

Phe Lys Gln Gly Val Asn Lys Tyr Tyr Asn Leu Phe Lys Asn Phe Glu  
225 230 235 240

Asp Glu Ser Phe Val Gln Asn Phe Leu Arg Ile Glu Lys Trp Leu Tyr  
245 250 255

Asp Thr Pro Pro Ile Ala Gly Glu Thr Phe Arg Gln Trp Val Lys Asp  
260 265 270

Ile Tyr Gln Gln Asn Leu Phe Ala Lys Asn Lys Met Ile Val Gly Glu  
275 280 285

Asn Lys Ile Asn Leu Ser Asn Ile Lys Val Pro Val Leu Asn Val Val  
 290 295 300

Ala Glu Phe Asp His Leu Val Thr Ser Asp Ser Ser Ser Ser Leu Asn  
 305 310 315 320

Asn Leu Ile Ser Ser Gln Asp Lys Ser Leu Met Lys Phe Pro Thr Gly  
 325 330 335

His Val Gly Leu Ile Ala Ser Asn Phe Ser Gln Lys Asn Val Leu Pro  
 340 345 350

Lys Ile Gly Lys Trp Ile Gln Thr His  
 355 360

<210> 10

<211> 582

<212> DNA

<213> Crenarchaeote

<400> 10

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ttgcaattag aaaataacaa tattggagag gaaaaaaaca gtaaaaacac tctatctgaa      60
gaggcaggac ttcagtctgt atttgaaaac ttataaaaac aattaacaga gttaaatagc      120
cttacaacct tggggccatt cacctcttta atgaatgac caaaccttaa tttaaataca      180
ttaaaggaac acggtaattt gttactgaga tatcagtcac ttctcaacct atacttttcc      240
cgtatgataa atgcttattt gttggccgta aacaagggtat cgtctgctat agatgaaaaa      300
aaccgacg atattaggaa aataatcata aatacttttg aggatgtgtt ctcgtcaatg      360
ttgcagtcaa cagacttttc aatcaattat aacaatttat tgaattccag cattgatgtc      420
atcaaaagtt atcaaaaaat ttacgattca aatgccgttt tgtttaggtc acaacaacaa      480
ctgtcaaaag aagaaaaaga cctgttattt tataatctct atgaaatcaa aaaaatatca      540
ttggaaatca aaaaaaatt aaatgagaaa aaaaatgaat aa                        582

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<210> 11

<211> 193

<212> PRT

&lt;213&gt; Crenarchaeote

&lt;400&gt; 11

Met Gln Leu Glu Asn Asn Asn Ile Gly Glu Glu Lys Asn Ser Lys Asn  
 1 5 10 15

Thr Leu Ser Glu Glu Ala Gly Leu Gln Ser Val Phe Glu Asn Phe Ile  
 20 25 30

Lys Gln Leu Thr Glu Leu Asn Ser Leu Thr Thr Leu Gly Pro Phe Thr  
 35 40 45

Ser Leu Met Asn Asp Pro Asn Leu Asn Leu Asn Thr Leu Lys Glu His  
 50 55 60

Gly Asn Leu Leu Leu Arg Tyr Gln Ser Phe Leu Asn Leu Tyr Phe Ser  
 65 70 75 80

Arg Met Ile Asn Ala Tyr Leu Leu Ala Val Asn Lys Val Ser Ser Ala  
 85 90 95

Ile Asp Glu Lys Asn Pro Asp Asp Ile Arg Lys Ile Ile Ile Asn Thr  
 100 105 110

Phe Glu Asp Val Phe Ser Ser Met Leu Gln Ser Thr Asp Phe Ser Ile  
 115 120 125

Asn Tyr Asn Asn Leu Leu Asn Ser Ser Ile Asp Val Ile Lys Ser Tyr  
 130 135 140

Gln Lys Ile Tyr Asp Ser Asn Ala Val Leu Phe Arg Ser Gln Gln Gln  
 145 150 155 160

Leu Ser Lys Glu Glu Lys Asp Leu Leu Phe Tyr Asn Leu Tyr Glu Ile  
 165 170 175

Lys Lys Ile Ser Leu Glu Ile Lys Lys Lys Leu Asn Glu Lys Lys Asn  
 180 185 190

Glu



&lt;210&gt; 12

&lt;211&gt; 438

&lt;212&gt; DNA

&lt;213&gt; Crenarchaeote

&lt;400&gt; 12

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atgcctacaa gttcagatgt tttatacatg tccaaaccag cggtgggatg tatacattct      60
tttgacatgg tgggcgggta tgcgcatacc caaaaactaa gatgctgtat cagcctcggg      120
aagagggtta tgtgggggac aatagaaaga atccatccac aaacgaatgg ttttggcaaa      180
tgtctgcctt ggctcattgt ttctatatat ggtttcgcca tagataatat ttgggtaatt      240
actcatgtgc ctgtatacaa aaatagacaa ccatctctac ctatatataa attttttgac      300
aagggtcagg ttctttttct ctttttttg caaattatgc cgggccaccc agaaacaaac      360
cccgcccttg ggcccgcaat gattactggg caaccocaaat ctacgcgccccc acgccagga      420
gtgcaagtga caatgtga                                     438

```

&lt;210&gt; 13

&lt;211&gt; 145

&lt;212&gt; PRT

&lt;213&gt; Crenarchaeote

&lt;400&gt; 13

```

Met Pro Thr Ser Ser Asp Val Leu Tyr Met Ser Lys Pro Ala Val Val
1           5           10           15

```

```

Cys Ile His Ser Phe Asp Met Val Gly Gly Tyr Ala His Thr Gln Lys
          20           25           30

```

```

Leu Arg Cys Cys Ile Ser Leu Gly Lys Arg Val Met Trp Gly Thr Ile
          35           40           45

```

```

Glu Arg Ile His Pro Gln Thr Asn Gly Phe Gly Lys Cys Leu Pro Trp
          50           55           60

```

```

Leu Ile Val Ser Ile Tyr Gly Phe Ala Ile Asp Asn Ile Trp Val Ile
          65           70           75           80

```

Thr His Val Pro Val Tyr Lys Asn Arg Gln Pro Ser Leu Pro Ile Tyr  
85 90 95

Lys Phe Phe Asp Lys Gly Gln Val Leu Phe Leu Leu Phe Leu Gln Ile  
100 105 110

Met Pro Gly His Pro Glu Thr Asn Pro Ala Phe Gly Pro Ala Met Ile  
115 120 125

Thr Gly Gln Pro Lys Ser Ser Ala Pro Arg Pro Gly Val Gln Val Thr  
130 135 140

Met  
145

<210> 14

<211> 915

<212> DNA

<213> Crenarchaeote

<400> 14

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aaaaccaaga tctttgttgt gtttcatcac catgaaccgc ggatatctat ttgcaagaac      120
tattttgaat ttctgtacaa ttatctaata caaaaggcta ctgcggtgat gcttaaggat      180
tctgatatga ttttgaccgt gagtcaagcg tcaaagcatg aactcaacac agtctatgga      240
ataggggtta gcaaaatcaa taatttgaag gaaacagcaa ataaaaaac cagggaatta      300
gcaaaaaatc tgaccaacag aattgccatt gtaggaactg gaatagataa aaatatcttt      360
ttaaaggatt ccaacagagg agtaatcaac aataaaaagg acattgattt tctttgtatc      420
ggaaggatag aaaaatttca tggactggag gaaatttgga ctgcaataaa aacactcaga      480
ccagaatcta attttgtaat ggttggggcg atacccttg ataaggctgc aaaactacgt      540
aatgcgggta tagatcacag aggtttgtc tccgaggaag aaaagattag cttttattct      600
aaatctaaag tctttatttt tccatcatcc agagagggtt ttggcattgc tgtggctgag      660
gccttagttt cgtgtgttcc cactgttgcc tggaaactcc ccgtttttga agaactatac      720
ttaaaaaatg gtaatacaaa cataaaacta atagaatatg gagaaaccac cctgtttgca      780
gaagagtgcg taaaaatgct aaataaatat ggcataatca aaaaggcgac tgaaggaaaa      840
aaggtcagtt tccaactccc aaactggcag acagtggcaa aaaatgtaat gacaacaata      900

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gaatctgtaa cctaa

915

&lt;210&gt; 15

&lt;211&gt; 304

&lt;212&gt; PRT

&lt;213&gt; Crenarchaeote

&lt;400&gt; 15

Met Asp Ser Trp Gly Glu Ser Asn Ile Val Leu Trp Leu Leu Leu Arg  
 1 5 10 15

Leu Phe Lys Pro Lys Thr Lys Ile Phe Val Val Phe His His His Glu  
 20 25 30

Pro Arg Ile Ser Ile Cys Lys Asn Tyr Phe Glu Phe Leu Tyr Asn Tyr  
 35 40 45

Leu Ile Gln Lys Ala Thr Ala Val Met Leu Lys Asp Ser Asp Met Ile  
 50 55 60

Leu Thr Val Ser Gln Ala Ser Lys His Glu Leu Asn Thr Val Tyr Gly  
 65 70 75 80

Ile Gly Val Ser Lys Ile Asn Asn Leu Lys Glu Thr Ala Asn Lys Lys  
 85 90 95

Thr Arg Glu Leu Ala Lys Asn Leu Thr Asn Arg Ile Ala Ile Val Gly  
 100 105 110

Thr Gly Ile Asp Lys Asn Ile Phe Leu Lys Asp Ser Asn Arg Gly Val  
 115 120 125

Ile Asn Asn Lys Lys Asp Ile Asp Phe Leu Cys Ile Gly Arg Ile Glu  
 130 135 140

Lys Phe His Gly Leu Glu Glu Ile Trp Thr Ala Ile Lys Thr Leu Arg  
 145 150 155 160

Pro Glu Ser Asn Phe Val Met Val Gly Arg Ile Pro Pro Asp Lys Ala  
 165 170 175

Ala Lys Leu Arg Asn Ala Gly Ile Asp His Arg Gly Phe Val Ser Glu  
 180 185 190

Glu Glu Lys Ile Ser Leu Tyr Ser Lys Ser Lys Val Phe Ile Phe Pro  
 195 200 205

Ser Ser Arg Glu Gly Phe Gly Ile Ala Val Ala Glu Ala Leu Val Ser  
 210 215 220

Cys Val Pro Thr Val Ala Trp Lys Leu Pro Val Phe Glu Glu Leu Tyr  
 225 230 235 240

Leu Lys Asn Gly Asn Thr Asn Ile Lys Leu Ile Glu Tyr Gly Glu Thr  
 245 250 255

Thr Leu Phe Ala Glu Glu Cys Val Lys Met Leu Asn Lys Tyr Gly Ile  
 260 265 270

Ile Lys Lys Ala Thr Glu Gly Lys Lys Val Ser Phe Gln Leu Pro Asn  
 275 280 285

Trp Gln Thr Val Ala Lys Asn Val Met Thr Thr Ile Glu Ser Val Thr  
 290 295 300

<210> 16

<211> 1692

<212> DNA

<213> Crenarchaeote

<400> 16

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 aaaatgctat cctgtatgaa aaaccggggt ccggatggca tgggtttgtc tacagagaat 120  
 caaatagttt attctgatac ctttgataat ccattgtttt cacaggtaga ggggcatgac 180  
 gtttttaggtc acagtcgttt ggcaatagtt ggtggctcct gtggtcagca gccgtttgtg 240  
 agttgtgata aaaaactcat tctggagcat aatggtgaaa tatataacta taaagaaatc 300  
 agaaagaacc tttctgcaca tcacactttt actacctcga ctgatagtga agttattggt 360  
 caccttcttg aagaccatta tcaaaacact aaaggcgatc taatcgaagc tataaggaga 420  
 accgttacct agcttgatgg aatttatgtt ttggcgatta gagagcagtc cacaggagat 480

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attgtgctgg tacgggatgg cattggagta agacaaattt actatgggtga aagtagtgat      540
ttcattgcat ttgcatcaga aagaaaagcc ttatggaaaa ttgctatgtc cgaccaaadc      600
aaaagacttt tgccaggcta tgctcttgtc atttcgcgga aggaagggtc ctccaatttc      660
aagactacat tgtttccgat ttctgtaaat acaaaaaaat caatatgtga gaaatattca      720
atcctgtaca cagacatcga ttctgcggtt aacgcatatg gtgatacatt ggttgaatct      780
atgagaaaaac gtgtgagtga ctttaaaaaa atcgggtattg ttttctccgg tgggattgac      840
agtgtaatgg tagcgtatgt ggcaaaacaa atggcccccg aagttatttg ctatacgtct      900
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aagttggaaa tagaacagat gactgaaagt gatgttgaaa gtaccattcc aaaaataatc     1020
agcataattg aagatgacaa catgggacag gttgaggttg ccattccaat atatggcgcg     1080
gttaaattgg ctcacgaaca ggaatacgg gtaatgctta caggtcaggg ggcagacgaa     1140
ctgtttggcg gatattcctg gtattccaaa attgttaaaa aacacggata cgaaaaaatt     1200
cagggatacc tgatagagga cattaagtta ctttācaaaag aaacactgga aagagaggac     1260
aaaataacca tgtctcaaag catagagtta cgcgaaccct ttttagatac taatctgata     1320
gacacggtac tgagaataga tccgcgactc aatattcaaa acaatggcaa taactatgac     1380
aacctaggaa aaagggttca ccgcaactt gcagaaaaac tagggattcc aaaagagata     1440
gcgtatagaa taaaggaagc agctcagcat gggtctggga tacacaacac cctcaatact     1500
ttggccatga aaaatggttt tacggaatcc aagggttaatt ctagtatatc ggacaaattg     1560

aaaaaaaggg agcttatcgg cagctcacia agatatgggc atctttttga aaaggaacaa     1620
atctggagtt tggagccgca tatacagatg tatttggaga atatttcaaa aaacatattg     1680
ccaaggaact ga                                             1692

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&lt;210&gt; 17

&lt;211&gt; 563

&lt;212&gt; PRT

&lt;213&gt; Crenarchaeote

&lt;400&gt; 17

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Met Cys Gly Ile Val Gly Ile Leu Ser Lys Lys Glu Arg Asn Val Ala
1           5           10          15

```

Pro Leu Ile Gly Lys Met Leu Ser Cys Met Lys Asn Arg Gly Pro Asp  
 20 25 30

Gly Met Gly Leu Ser Thr Glu Asn Gln Ile Val Tyr Ser Asp Thr Phe  
 35 40 45

Asp Asn Pro Leu Phe Ser Gln Val Glu Gly His Asp Val Leu Gly His  
 50 55 60

Ser Arg Leu Ala Ile Val Gly Gly Ser Cys Gly Gln Gln Pro Phe Val  
 65 70 75 80

Ser Cys Asp Lys Lys Leu Ile Leu Glu His Asn Gly Glu Ile Tyr Asn  
 85 90 95

Tyr Lys Glu Ile Arg Lys Asn Leu Ser Ala His His Thr Phe Thr Thr  
 100 105 110

Ser Thr Asp Ser Glu Val Ile Val His Leu Leu Glu Asp His Tyr Gln  
 115 120 125

Asn Thr Lys Gly Asp Leu Ile Glu Ala Ile Arg Arg Thr Val Thr Gln  
 130 135 140

Leu Asp Gly Ile Tyr Val Leu Ala Ile Arg Glu Gln Ser Thr Gly Asp  
 145 150 155 160

Ile Val Leu Val Arg Asp Gly Ile Gly Val Arg Gln Ile Tyr Tyr Gly  
 165 170 175

Glu Ser Ser Asp Phe Ile Ala Phe Ala Ser Glu Arg Lys Ala Leu Trp  
 180 185 190

Lys Ile Ala Met Ser Asp Gln Ile Lys Arg Leu Leu Pro Gly Tyr Ala  
 195 200 205

Leu Val Ile Ser Arg Lys Glu Gly Ser Ser Asn Phe Lys Thr Thr Leu  
 210 215 220

Phe Pro Ile Ser Val Asn Thr Lys Lys Ser Ile Cys Glu Lys Tyr Ser  
 225 230 235 240

Ile Leu Tyr Thr Asp Ile Asp Ser Ala Val Asn Ala Tyr Gly Asp Thr  
 245 250 255

Leu Val Glu Ser Met Arg Lys Arg Val Ser Asp Phe Lys Lys Ile Gly  
 260 265 270

Ile Val Phe Ser Gly Gly Ile Asp Ser Val Ile Val Ala Tyr Leu Ala  
 275 280 285

Lys Gln Met Ala Pro Glu Val Ile Cys Tyr Thr Ser Gly Ile Lys Gly  
 290 295 300

Ser Ser Asp Ile Leu Asn Ser Leu Glu Ile Ala Glu Lys Leu Asp Leu  
 305 310 315 320

Lys Leu Glu Ile Glu Gln Met Thr Glu Ser Asp Val Glu Ser Thr Ile  
 325 330 335

Pro Lys Ile Ile Ser Ile Ile Glu Asp Asp Asn Met Gly Gln Val Glu  
 340 345 350

Val Ala Ile Pro Ile Tyr Gly Ala Val Lys Leu Ala His Glu Gln Gly  
 355 360 365

Ile Arg Val Met Leu Thr Gly Gln Gly Ala Asp Glu Leu Phe Gly Gly  
 370 375 380

Tyr Ser Trp Tyr Ser Lys Ile Val Lys Lys His Gly Tyr Glu Lys Ile  
 385 390 395 400

Gln Gly Tyr Leu Ile Glu Asp Ile Lys Leu Leu Tyr Lys Glu Thr Leu  
 405 410 415

Glu Arg Glu Asp Lys Ile Thr Met Ser Gln Ser Ile Glu Leu Arg Glu  
 420 425 430

Pro Phe Leu Asp Thr Asn Leu Ile Asp Thr Val Leu Arg Ile Asp Pro  
 435 440 445

Arg Leu Asn Ile Gln Asn Asn Gly Asn Asn Tyr Asp Asn Leu Gly Lys  
 450 455 460

Arg Val His Arg Lys Leu Ala Glu Lys Leu Gly Ile Pro Lys Glu Ile  
 465 470 475 480

Ala Tyr Arg Ile Lys Glu Ala Ala Gln His Gly Ser Gly Ile His Asn  
 485 490 495

Thr Leu Asn Thr Leu Ala Met Lys Asn Gly Phe Thr Glu Ser Lys Val  
 500 505 510

Asn Ser Ser Tyr Leu Asp Lys Leu Lys Lys Arg Glu Leu Ile Gly Ser  
 515 520 525

Ser Gln Arg Tyr Gly His Leu Phe Glu Lys Glu Gln Ile Trp Ser Leu  
 530 535 540

Glu Pro His Ile Gln Met Tyr Leu Glu Asn Ile Ser Lys Asn Ile Leu  
 545 550 555 560

Pro Arg Asn

<210> 18

<211> 666

<212> DNA

<213> Crenarchaeote

<400> 18

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cacatccagt ccgacaaatc cattccaggc tatgttaaga cacagaagat agccgctgtg      180
attaggggaa tagaagaaag ggaaatagaa attgcttttg actccatccc ccctgcaaag      240
aacagccagg aggtgatatc tttgctgaag aaaaaagggt tcagaatagg gataattaca      300
gatagttaca gtgttgctgc tcaggccttg gtgaacaaac ttgatttgga ctttttttat      360
gcaaatgaat tgaaggtaga caatgggata gtcaccggag aaataaatat gccgttagga      420
tgggaaaaaaa tagactgttt ttgcaagaat tctgtgtgta agagatatca catggaaatc      480
catgcaaaga aaatctgtgc agacataaaa aatacaattg ctattggcga tactaaaggt      540
gacctgtgca tgataaagca ggcaggaata ggtatcgcat atatgcctaa ggataaatat      600
ataaatgaaa caataaataa ggtaaacaca ccggatatga ttggtgtcct tgattttata      660
gagtag                                          666

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<210> 19

<211> 221



&lt;212&gt; PRT

&lt;213&gt; Crenarchaeote

&lt;400&gt; 19

Met Leu Tyr Pro Met Glu Phe Lys Ser Thr Leu Ala Val Phe Asp Met  
 1 5 10 15

Asp Gly Thr Leu Ile Asp Gly Arg Leu Ile Glu Val Leu Ser Lys Lys  
 20 25 30

Phe Gly Leu Tyr Ala Gln Val Arg His Ile Gln Ser Asp Lys Ser Ile  
 35 40 45

Pro Gly Tyr Val Lys Thr Gln Lys Ile Ala Ala Val Ile Arg Gly Ile  
 50 55 60

Glu Glu Arg Glu Ile Glu Ile Ala Leu Asp Ser Ile Pro Pro Ala Lys  
 65 70 75 80

Asn Ser Gln Glu Val Ile Ser Leu Leu Lys Lys Lys Gly Phe Arg Ile  
 85 90 95

Gly Ile Ile Thr Asp Ser Tyr Ser Val Ala Ala Gln Ala Leu Val Asn  
 100 105 110

Lys Leu Asp Leu Asp Phe Phe Tyr Ala Asn Glu Leu Lys Val Asp Asn  
 115 120 125

Gly Ile Val Thr Gly Glu Ile Asn Met Pro Leu Gly Trp Glu Lys Ile  
 130 135 140

Asp Cys Phe Cys Lys Asn Ser Val Cys Lys Arg Tyr His Met Glu Ile  
 145 150 155 160

His Ala Lys Lys Ile Cys Ala Asp Ile Lys Asn Thr Ile Ala Ile Gly  
 165 170 175

Asp Thr Lys Gly Asp Leu Cys Met Ile Lys Gln Ala Gly Ile Gly Ile  
 180 185 190

Ala Tyr Met Pro Lys Asp Lys Tyr Ile Asn Glu Thr Ile Asn Lys Val  
 195 200 205

Asn Thr Pro Asp Met Ile Gly Val Leu Asp Phe Ile Glu  
 210 215 220

<210> 20

<211> 1212

<212> DNA

<213> Crenarchaeote

<400> 20

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catcagtcta taaaggcctt tggttatgac gaactgtcaa gcatattcca agaacttgcc      180
atagtcattc cagtaaagaa cgaaaaaatc agccttcttg aaggagtatt gagcgggtatt      240
ccaaatgaat gtctcatcat catagtttcc aatagccaaa ggactcctgt cgacagattt      300
gccatggagg ttgaaatggg aaggcagtac tctagttttg cagacaagaa aataatgatt      360
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cacaataatg atatgaccaa actcaacttt aagaaaaaac accttataat ggatcccata     1140
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<210> 21

&lt;211&gt; 403

&lt;212&gt; PRT

&lt;213&gt; Crenarchaeote

&lt;400&gt; 21

Met Arg Leu Asp Tyr Pro Pro Asn Tyr Thr Glu Arg Ile Gly Ala Val  
 1 5 10 15

Ser Ile His Ala Leu Gln Lys Ile Tyr Glu Ile Asp Ser Gly Lys Met  
 20 25 30

Pro Lys Phe Asn Gly Leu His Gln His Gln Ser Ile Lys Ala Phe Gly  
 35 40 45

Tyr Asp Glu Leu Ser Ser Ile Phe Gln Glu Leu Ala Ile Val Ile Pro  
 50 55 60

Val Lys Asn Glu Lys Ile Ser Leu Leu Glu Gly Val Leu Ser Gly Ile  
 65 70 75 80

Pro Asn Glu Cys Leu Ile Ile Ile Val Ser Asn Ser Gln Arg Thr Pro  
 85 90 95

Val Asp Arg Phe Ala Met Glu Val Glu Met Val Arg Gln Tyr Ser Ser  
 100 105 110

Phe Ala Asp Lys Lys Ile Met Ile Ile His Gln Asn Asp Pro Glu Leu  
 115 120 125

Ala Asn Thr Phe Lys Lys Ile Lys Tyr Arg Ser Ile Leu Asn Thr Lys  
 130 135 140

Ser Gln Val Arg Ser Gly Lys Ala Glu Gly Met Ile Ile Gly Ile Leu  
 145 150 155 160

Leu Ala Lys Met His Leu Lys Glu Tyr Ile Gly Phe Ile Asp Ser Asp  
 165 170 175

Asn Tyr Phe Pro Gly Ala Val Asn Glu Tyr Val Lys Ile Phe Ala Ala  
 180 185 190

Gly Phe Gly Met Ala Thr Thr Pro Tyr Ser Asn Ile Arg Ile Ser Trp  
 195 200 205

Arg Ser Lys Pro Lys Ile Val Asn Asn Ser Leu Gln Phe Pro Arg Trp  
 210 215 220

Gly Arg Ile Ser Glu Ser Ser Asn Lys Tyr Leu Asn Ala Leu Ile Ser  
 225 230 235 240

His Ile Thr Gly Phe Glu Arg Glu Ile Ile Thr Thr Gly Asn Ala Gly  
 245 250 255

Glu His Ala Leu Ser Met Ser Leu Ala Glu Asn Leu Asn Tyr Ser Ser  
 260 265 270

Gly Tyr Ser Val Glu Pro Tyr Glu Phe Ile Asn Ile Leu Glu Lys Phe  
 275 280 285

Gly Gly Leu Leu Pro Ser Asn Asn Pro Asp Ile Ile Glu Lys Gly Ile  
 290 295 300

Glu Ile Phe Gln Ile Glu Thr Arg Asn Pro His Phe His Glu Glu Lys  
 305 310 315 320

Gly Asn Asp His Leu Ala Gly Met Met Gln Glu Ser Leu Leu Ala Ile  
 325 330 335

Asn Asn Ser Lys Ile Cys Asn Thr Glu Leu Thr Arg Glu Ile Asn Asp  
 340 345 350

His Leu Leu Met Leu Gln Val Lys His Asn Asn Asp Met Thr Lys Leu  
 355 360 365

Asn Phe Lys Lys Lys His Leu Ile Met Asp Pro Ile Lys Ile Ile Pro  
 370 375 380

Ile Asp Lys Phe Ala Glu Phe Val Val Lys Asn Ser Lys Thr Phe Ile  
 385 390 395 400

Arg Ile Gly

<210> 22

<211> 1164

<212> DNA

&lt;213&gt; Crenarchaeote

&lt;400&gt; 22

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acatcaattg gcggtttgaa tgccacagtt attgccggca gtaaagaaga tcgtccagaa      180
aaatcattgg agaatttttg gatggaaata gctgatacta ataatggtaa tattaatata      240
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ccaagatggg gacctgaaaa tatcttttaa gatccacagt atttcacacc tagcaaatgg      420
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aaattacagc caaacggtaa gcccaacgca aggctaata taaccgcagt taacgtgatg      540
acggcgggag cccttatttt tgacagtgcc aagcaacaaa taaccccaaa acacatactt      600
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tatataacac gggacgagcc atccccctcc ctttatgaga atgcagactt ttcaaaaaat     1080
gcaataaagg catcgattaa tgatggagaa caaaaggctg acaggataat aaaagaaatc     1140
caaacgaaag gaaaacgaaa ataa.                                           1164

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&lt;210&gt; 23

&lt;211&gt; 387

&lt;212&gt; PRT

&lt;213&gt; Crenarchaeote

&lt;400&gt; 23

```

Met Ser Asp Ala Ile Glu Asn Val Leu Ile Leu Gln Gly Gly Gly Ser
1           5           10           15

```

Leu Gly Ala Phe Gly Cys Gly Val Tyr Lys Ala Leu Val Asn Asn Asn  
20 25 30

Ile Lys Leu Asp Ile Leu Ser Gly Thr Ser Ile Gly Gly Leu Asn Ala  
35 40 45

Thr Val Ile Ala Gly Ser Lys Glu Asp Arg Pro Glu Lys Ser Leu Glu  
50 55 60

Asn Phe Trp Met Glu Ile Ala Asp Thr Asn Asn Gly Asn Ile Asn Thr  
65 70 75 80

Tyr Leu Asn Phe Pro Phe Phe Glu Ser Pro Phe Pro Gly Gln Ile Pro  
85 90 95

Phe Pro Leu Ala Ser Glu Ser Thr Leu Ser Phe Tyr Ser Ser Ala Ile  
100 105 110

Tyr Gly Asn Arg Lys Ile Phe Leu Pro Arg Trp Gly Pro Glu Asn Ile  
115 120 125

Phe Lys Asp Pro Gln Tyr Phe Thr Pro Ser Lys Trp Thr Tyr Leu Tyr  
130 135 140

Asp His Ser Pro Leu Val Lys Thr Leu Glu Lys Tyr Ile Asp Tyr Ser  
145 150 155 160

Lys Leu Gln Pro Asn Gly Lys Pro Asn Ala Arg Leu Ile Ile Thr Ala  
165 170 175

Val Asn Val Met Thr Ala Glu Pro Leu Ile Phe Asp Ser Ala Lys Gln  
180 185 190

Gln Ile Thr Pro Lys His Ile Leu Ala Thr Thr Ala Tyr Pro Thr Tyr  
195 200 205

Phe Phe Gln Trp Val Glu Leu Glu Lys Gly Leu Phe Ala Trp Asp Gly  
210 215 220

Ser Leu Leu Ser Asn Thr Pro Leu Arg Glu Val Ile Asp Ala Ser Pro  
225 230 235 240

Ala Lys Asp Lys Arg Ile Phe Leu Val Glu Asn Tyr Pro Lys Asn Ile  
245 250 255

Glu Lys Leu Pro Ser Asn Leu Gln Glu Val Lys His Arg Ala Arg Asp  
260 265 270

Ile Met Phe Ser Asp Lys Thr Val His Ser Ile His Met Ser Lys Ala  
275 280 285

Ile Thr Leu Gln Leu Lys Leu Ile Asp Asp Leu Tyr Lys Met Leu Glu  
290 295 300

Tyr Tyr Phe Asn Ser Glu Lys Ile Glu Glu Lys Glu Lys Phe Glu Lys  
305 310 315 320

Ile Arg Ala Arg Tyr Lys Lys Val Ser Glu Glu His Gly Ala Glu Ile  
325 330 335

Lys Gly Val Tyr Tyr Ile Thr Arg Asp Glu Pro Ser Pro Ser Leu Tyr  
340 345 350

Glu Asn Ala Asp Phe Ser Lys Asn Ala Ile Lys Ala Ser Ile Asn Asp  
355 360 365

Gly Glu Gln Lys Ala Asp Arg Ile Ile Lys Glu Ile Gln Thr Lys Gly  
370 375 380

Lys Arg Lys  
385

<210> 24

<211> 882

<212> DNA

<213> Crenarchaeote

<400> 24

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agcgagcag catccctagc agccctgtac tcaaaagtaa aacatggaac gcatgtttct 180  
gtgggcacaa tgggtcctcc aatagcagaa tcggccttac agcaatctca actgatttgc 240  
gacgctgatg aactgcatct ttatagtgat cgcattcttg caggagccga caccctggcc 300  
acagctgaag ttttgatagc aggaataaaa aaaatggcaa atggtcaaga tgtggacatt 360

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gttttctcag ggcacagggc atctgatggc gaaacagggc aaacaggacc ccagacagca 420
tggaattag gttatccgtt ccttggaat gttattgatt acgatattga cgttgtgaag 480
agaattgtaa gggtagaacg tctaatacag atttacggtc atcctgatat tatagaggag 540
atggaggcgc ctctaccggt ttttatcaca ctggacccat cctacaatcc gtcttttaac 600
acggtatccc aaaggctcag actagcacga aacctacagg aagcccatga tagatcacia 660
aggtataagg aatatctcaa aactttcaat gccatggaac tagaagtcaa tccaaagtct 720
gtcggactgc ctggctctcc caccatagtt tataaagttg aaaaaatacc aagggcaaag 780
gcaaatacaa aagcagatgt tgtggatggg tctaaccagg atagtctaag gcagggtgca 840
cgccgaatcc atgatgtttt aggggggtga gtcataaagt ga 882

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&lt;210&gt; 25

&lt;211&gt; 293

&lt;212&gt; PRT

&lt;213&gt; Crenarchaeote

&lt;400&gt; 25

```

Met Glu Leu Asn Ala Ala Val Ile Val Lys Leu Glu Pro Asp Phe Ser
1           5           10           15

```

```

Glu Gly Asn Val Ser Tyr Asn Ser Asp Gly Thr Leu Asn Arg Ala Glu
20           25           30

```

```

Thr Lys Asn Ile Leu Gly Pro His Ser Ala Ala Ala Ser Leu Ala Ala
35           40           45

```

```

Leu Tyr Ser Lys Val Lys His Gly Thr His Val Ser Val Gly Thr Met
50           55           60

```

```

Gly Pro Pro Ile Ala Glu Ser Ala Leu Gln Gln Ser Gln Leu Ile Cys
65           70           75           80

```

```

Asp Ala Asp Glu Leu His Leu Tyr Ser Asp Arg Ile Phe Ala Gly Ala
85           90           95

```

```

Asp Thr Leu Ala Thr Ala Glu Val Leu Ile Ala Gly Ile Lys Lys Met
100          105          110

```



Ala Asn Gly Gln Asp Val Asp Ile Val Phe Ser Gly His Arg Ala Ser  
 115 120 125

Asp Gly Glu Thr Gly Gln Thr Gly Pro Gln Thr Ala Trp Lys Leu Gly  
 130 135 140

Tyr Pro Phe Leu Gly Asn Val Ile Asp Tyr Asp Ile Asp Val Val Lys  
 145 150 155 160

Arg Ile Val Arg Val Gln Arg Leu Ile Lys Ile Tyr Gly His Pro Asp  
 165 170 175

Ile Ile Glu Glu Met Glu Ala Pro Leu Pro Val Phe Ile Thr Leu Asp  
 180 185 190

Pro Ser Tyr Asn Pro Ser Phe Asn Thr Val Ser Gln Arg Leu Arg Leu  
 195 200 205

Ala Arg Asn Leu Gln Glu Ala His Asp Arg Ser Gln Arg Tyr Lys Glu  
 210 215 220

Tyr Leu Lys Thr Phe Asn Ala Met Glu Leu Glu Val Asn Pro Lys Ser  
 225 230 235 240

Val Gly Leu Pro Gly Ser Pro Thr Ile Val Tyr Lys Val Glu Lys Ile  
 245 250 255

Pro Arg Ala Lys Ala Asn Arg Lys Ala Asp Val Val Asp Gly Ser Asn  
 260 265 270

Gln Asp Ser Leu Arg Gln Val Ala Arg Arg Ile His Asp Val Leu Gly  
 275 280 285

Gly Val Val Ile Lys  
 290

<210> 26

<211> 1284

<212> DNA

<213> Crenarchaeote

<400> 26

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60

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agaaggctaa tggatgattt taatcacaaa tacaagccag aggaaaaagt ggttgcgatt 240
atactcggcc ataacatcaa gcacctgtgc caggaactaa tccaccatgg tgcagacgca 300
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tttaacagac cccgttacat gtttttttcc gcagatgaca caggaaggca tttatcatca 480
accgttttgg cagaattgca atcagggtg gcacagaca taaacaaact tgttatcaat 540
gatttagaaa taaggcatga acacaagaca aagggtaaac ccattgtcta tgaaaagaca 600
cttgaaatgt acagaccaga cttttcaggc tttcttttga ccaccatact ctgcttggat 660
aatataaatc ccgagaacag aaggaaattc catccacagg catgcagtat aatcccaggc 720
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gaacaaaaca taaaactgat agagaacctt gcaaaggaaa tagaagcaga aataggaata 960
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caaataccac aggagataga atga 1284

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&lt;210&gt; 27

&lt;211&gt; 427

&lt;212&gt; PRT

&lt;213&gt; Crenarchaeote

&lt;400&gt; 27

```

Met Thr Ser Ser Leu Ser Ala Ile Pro Asp Ala Lys Leu Asp Glu Arg
1           5           10           15

```

Pro Asn Gln Asn Ala His Val Asn Asp Asn Pro Glu Lys Glu Arg Gly  
20 25 30

Asp Asn Asn Arg His Leu Tyr Val Val Ile Glu Gln Glu Glu Gly Thr  
35 40 45

Ile Leu Pro Val Ser Phe Glu Met Leu Gly Glu Ala Arg Arg Leu Met  
50 55 60

Asp Asp Phe Asn His Lys Tyr Lys Pro Glu Glu Lys Val Val Ala Ile  
65 70 75 80

Ile Leu Gly His Asn Ile Lys His Leu Cys Gln Glu Leu Ile His His  
85 90 95

Gly Ala Asp Ala Val Ile Tyr Ala Asp His Pro Glu Leu Arg His Pro  
100 105 110

Arg Asn Leu Leu Tyr Thr Lys Val Val Cys Gln Ile Ala Thr Asp Lys  
115 120 125

Glu Ser Ala Ala Arg Ile Trp Pro Ser Asn Pro Asp Phe Asn Arg Pro  
130 135 140

Arg Tyr Met Phe Phe Ser Ala Asp Asp Thr Gly Arg His Leu Ser Ser  
145 150 155 160

Thr Val Leu Ala Glu Leu Gln Ser Gly Leu Ala Ser Asp Ile Asn Lys  
165 170 175

Leu Val Ile Asn Asp Leu Glu Ile Arg His Glu His Lys Thr Lys Gly  
180 185 190

Lys Pro Ile Val Tyr Glu Lys Thr Leu Glu Met Tyr Arg Pro Asp Phe  
195 200 205

Ser Gly Phe Leu Trp Thr Thr Ile Leu Cys Leu Asp Asn Ile Asn Pro  
210 215 220

Glu Asn Arg Arg Lys Phe His Pro Gln Ala Cys Ser Ile Ile Pro Gly  
225 230 235 240

Val Phe Pro Gln Met Glu Gly Asp Thr Asp Arg Lys Gly Thr Ile Ile  
245 250 255

Glu Phe Ser Pro Thr Ile Ala Gln Glu Asp Leu Arg Ile Lys Ile Ile  
 260 265 270

Asn Arg Arg Val Ile Lys Ser Lys Val Asp Phe Ser Asn Lys Lys Ile  
 275 280 285

Ile Val Ser Phe Gly Arg Gly Ile Lys Glu Ser Pro Glu Gln Asn Ile  
 290 295 300

Lys Leu Ile Glu Asn Leu Ala Lys Glu Ile Glu Ala Glu Ile Gly Ile  
 305 310 315 320

Ser Leu Pro Ile Ser Lys Lys Pro Tyr Pro Ile Ser Glu Ser Leu Ser  
 325 330 335

Ser Thr Tyr Met Ile Pro Asp Arg Val Ile Gly Thr Ser Gly Arg Lys  
 340 345 350

Val Asn Pro Gln Val Tyr Phe Ala Ile Gly Ile Ser Gly Ala Val Gln  
 355 360 365

His Ile Ala Gly Met Lys Glu Ser Glu Phe Val Ile Ser Ile Asn Pro  
 370 375 380

Asp Ser Glu Ala Pro Ile Ile Asp Glu Ser Asp Val Leu Ile Lys Gly  
 385 390 395 400

Lys Ile Glu Gln Val Leu Pro Leu Leu Ile Asn Glu Leu Lys Lys Tyr  
 405 410 415

Lys Glu Arg Leu Gln Ile Pro Gln Glu Ile Glu  
 420 425

<210> 28

<211> 1878

<212> DNA

<213> Crenarchaeote

<400> 28

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ggaacaaaa acgtgtctgg gggcatattg tattccaaaa aaacagcaac tggaaaggtc 180

cacaatgtag aagatgtgtt tgataatfff ctggcagacg ctccgctgga aaggaagata	240
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gcacacgact atcaaacgaa ttttggttac accgtcctgc tcaacaaact actttcatgg	360
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catttaaggt cgataatctg gaaagatgac agtaccataa ttatagagac agatgaactt	480
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gcagaagctg tctcaaagtc aatagatcaa aataactttc agtttgacaa cattggtgaa	1320
cgctacacta aatcagtgga tgaaagtcca tataccgcag acatgagcag gatcgacgca	1380
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attgcaaact ctatagggtg caaaaggctt ttacctgtga ttgagtcaga caaaacctac	1560
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tcacacatca aggttttgaa ctgcgaaagt gactttatga aaaaaatgggt ccaactgtgc	1740
cctaccaaatt gctacagtat tgagaatgag cggataatgc tacagcacga aggatgcata	1800
gagtgtggga catgcgcaag agaaacagaa tggaggcatc ctctgtggga aaaaggaata	1860
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&lt;210&gt; 29

&lt;211&gt; 625

&lt;212&gt; PRT

&lt;213&gt; Crenarchaeote

&lt;400&gt; 29

Met Thr Met Glu Ser Phe Asp Val Ala Ile Ile Gly Gly Gly Ser Ala  
 1 5 10 15

Gly Leu Ala Ala Leu Glu His Leu Ser Asn Leu Gly Lys Gln Ala Ile  
 20 25 30

Leu Ile Glu Ala Gly Lys Lys Ile Gly Thr Lys Asn Val Ser Gly Gly  
 35 40 45

Ile Leu Tyr Ser Lys Lys Thr Ala Thr Gly Lys Val His Asn Val Glu  
 50 55 60

Asp Val Phe Asp Asn Phe Leu Ala Asp Ala Pro Leu Glu Arg Lys Ile  
 65 70 75 80

Ile Lys Tyr Met Leu His Ala Val Ser Arg Glu Lys Ala Phe Ser Leu  
 85 90 95

Asp Leu Thr Leu Ala His Asp Tyr Gln Thr Asn Phe Gly Tyr Thr Val  
 100 105 110

Leu Leu Asn Lys Leu Leu Ser Trp Phe Ala Arg Glu Ala Ser Gln Ser  
 115 120 125

Ala Glu Lys Leu Gly Gly Gly Ile Ile Thr Gly Val His Leu Arg Ser  
 130 135 140

Ile Ile Trp Lys Asp Asp Ser Thr Ile Ile Ile Glu Thr Asp Glu Leu  
 145 150 155 160

Glu Pro Phe Gln Val Lys Ala Val Ile Ala Ala Asp Gly Val Asn Ser  
 165 170 175

Glu Val Ala Gln Ile Thr Gly Ala Arg Ser Lys Phe Thr Pro Ser Asp  
 180 185 190

Leu Tyr Gln Gly Val Lys Val Val Ala Lys Leu Pro Glu Gly Leu Leu  
195 200 205

Glu Glu Arg Phe Gly Val Ser Glu Asn Glu Gly Ala Ala His Leu Phe  
210 215 220

Ser Gly Asp Ile Thr Leu Asn His Ile Gly Gly Gly Phe Leu Tyr Thr  
225 230 235 240

Asn Arg Asp Thr Ile Ser Ile Gly Ala Val Tyr His Tyr Asp Ser Leu  
245 250 255

Ile Glu Lys Pro Thr Glu Pro Asn Ala Leu Val Asn Ala Leu Leu Ser  
260 265 270

Asn Pro Phe Val Met Glu Leu Ile Lys Asp Glu Val Pro Arg Ile Lys  
275 280 285

Glu Asp Tyr Arg Asp Leu Ser Lys Asp Glu Glu Leu Arg Ile Arg Phe  
290 295 300

Lys Ser Asn Lys Leu Ile Lys Ser Trp Asn Asp Leu His His Thr Tyr  
305 310 315 320

Tyr Ser Pro Ser Ala Val Ala Glu Leu Val Ala Gln Gly Lys Tyr Lys  
325 330 335

Ser Arg Glu Glu Ile Lys Asp Lys Ile Asp Ser Leu Tyr Asn Glu Leu  
340 345 350

Val Thr Lys Tyr Asn Thr Glu Phe Glu Thr Asn Tyr Val Glu Leu Glu  
355 360 365

Tyr Ser Ala Lys Leu Val Pro Asp Gly Lys Arg Cys Arg Met Lys Lys  
370 375 380

Pro Tyr Phe Lys Asn Ile Leu Phe Val Gly Asp Ala Ala Gly Arg Gly  
385 390 395 400

Ile Phe Leu Gly Pro Arg Ile Glu Gly Leu Asn Val Gly Ile Asp Asp  
405 410 415

Ala Val Arg Ala Ala Glu Ala Val Ser Lys Ser Ile Asp Gln Asn Asn  
420 425 430

Phe Gln Phe Asp Asn Ile Gly Glu Arg Tyr Thr Lys Ser Val Asp Glu  
 435 440 445  
 Ser Pro Tyr Thr Ala Asp Met Ser Arg Ile Asp Ala Asn Tyr Leu Lys  
 450 455 460  
 Ala Val Leu Asp Cys Thr Lys Lys Val Pro Lys Asn Thr Leu Gly Phe  
 465 470 475 480  
 Lys Tyr Gly Ser Ile Val Lys Leu Met Ser Asn Ser Thr Phe Arg Asn  
 485 490 495  
 Val Ser Ile Gly Ile Ala Asn Ser Ile Gly Tyr Lys Arg Leu Leu Pro  
 500 505 510  
 Val Ile Glu Ser Asp Lys Thr Tyr Asn Gln Ile Pro Ile Glu Ile Ala  
 515 520 525  
 Glu Arg Asn Gly Lys Asp Leu Arg Lys Ser Tyr Ser Ile Glu Ile Pro  
 530 535 540  
 Thr Ile Ala Glu Arg Ile Ala Asn Leu Asn Tyr Asn Asp Asp Ser Leu  
 545 550 555 560  
 Ser His Ile Lys Val Leu Asn Ser Gln Ser Asp Phe Met Lys Lys Met  
 565 570 575  
 Val Gln Leu Cys Pro Thr Lys Cys Tyr Ser Ile Glu Asn Glu Arg Ile  
 580 585 590  
 Met Leu Gln His Glu Gly Cys Ile Glu Cys Gly Thr Cys Ala Arg Glu  
 595 600 605  
 Thr Glu Trp Arg His Pro Arg Gly Glu Lys Gly Ile Ile Tyr Asn Tyr  
 610 615 620

Gly  
 625

<210> 30

<211> 2238

<212> DNA

<213> Crenarchaeote



<400> 30  
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 aatgtatgtg aaaataaata cattgacgca aaccccggtt tgtcgacaaa acgcggtttt 120  
 ggtgacgtca acaataacga gaacgataat gatggtggtg ttgacgccgg tgcacccacc 180  
 acaaaggtgt actatggccc tgaaaacgca aacaacgcca ttttgagggt catagacagg 240  
 gccaatgtga agatagactc ttgcataaac tccgtggccc cgtccgtgat gataggggtt 300  
 gacgccataa gggagaaaag ggttgacgcg gtcaaaaaca ggggocctta actgcggtat 360  
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 attaggcacc tggatgggct gaagggaaac tttgagggtg ccgaccagag ggagtatgtg 480  
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 gagcacagga taaaggagct ggaggatggg gttgtcatgc ccgtctcact ggtcttctcc 660  
 aactacaagg acgcggtcca aaggagttt gaaatgataa gcagggccaa aaggagata 720  
 ctgataatgt actccacggt taacgcgttc cacctgcagg aaaaaggcgg cactctgcaa 780  
 ctcttgaagg agatggtgga gcaaaacgac agcctgagga tcaacatcct cagccgatg 840  
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 gtcctctatg accagagtgt cctgttccag cagcttgacc aaaacgacaa agtcaaaagc 1140  
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 gtggcgatag tgtttttgcc atctgacggc aacagaaatg gcgggtactc cagaggtggc 1500  
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 acgcagcaaa aagagcagtg ggtagaacc gttaatggcc ccaaccacct tttgtatgta 1620  
 gactgtgatc cgcaaaagat aagccaggtt gttttcaacc tgctggacaa cgcaatgaag 1680  
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aactccaaaa taagggatca gctgtttcag aaatttgtca caaagtcaaa ccagggaacc 1980
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gaggagacaa acagcaaggg cggcaacagc agcagcagga acaacactaa agataaagac 2100
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&lt;210&gt; 31

&lt;211&gt; 745

&lt;212&gt; PRT

&lt;213&gt; Crenarchaeote

&lt;400&gt; 31

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Met Glu Gly Ser Ser Leu Ile His Asn Asn Asn Leu His Asp Ile Gly
1          5          10          15

```

```

Thr Asn Asn Asp Asn Val Cys Glu Asn Lys Tyr Ile Asp Ala Asn Pro
20          25          30

```

```

Gly Leu Ser His Lys Arg Gly Phe Gly Asp Val Asn Asn Asn Glu Asn
35          40          45

```

```

Asp Asn Asp Gly Gly Val Asp Ala Gly Ala Pro Thr Thr Lys Val Tyr
50          55          60

```

```

Tyr Gly Pro Glu Asn Ala Asn Asn Ala Ile Leu Arg Phe Ile Asp Arg
65          70          75          80

```

```

Ala Asn Val Lys Ile Asp Ser Cys Ile Asn Ser Val Ala Pro Ser Val
85          90          95

```

```

Met Ile Gly Val Asp Ala Ile Arg Glu Lys Arg Val Asp Ala Val Lys
100          105          110

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Asn Arg Gly Leu Lys Leu Arg Tyr Val Thr Glu Ile Thr Lys Asp Asn  
 115 120 125

Val Gly Tyr Val Lys Glu Met Leu Ser Phe Ser Glu Ile Arg His Leu  
 130 135 140

Asp Gly Leu Lys Gly Asn Phe Glu Val Ala Asp Gln Arg Glu Tyr Val  
 145 150 155 160

Ala Val Ala Thr Leu His Ala Ala Gln Ser Ile Pro Gln Leu Leu Phe  
 165 170 175

Ser Asn Leu Pro Glu Ile Ala Glu Gln Gln Gln Phe Val Phe Asp Ser  
 180 185 190

Phe Trp Gly Arg Ala Leu Pro Ala Glu His Arg Ile Lys Glu Leu Glu  
 195 200 205

Asp Gly Val Val Met Pro Val Ser Leu Val Phe Ser Asn Tyr Lys Asp  
 210 215 220

Ala Val Gln Arg Glu Phe Glu Met Ile Ser Arg Ala Lys Arg Glu Ile  
 225 230 235 240

Leu Ile Met Tyr Ser Thr Val Asn Ala Phe His Leu Gln Glu Lys Gly  
 245 250 255

Gly Thr Leu Gln Leu Leu Lys Glu Met Val Glu Gln Asn Asp Ser Leu  
 260 265 270

Arg Ile Asn Ile Leu Thr Pro Met Asp Ala Ser Val Arg Glu Ser Leu  
 275 280 285

Ser Leu Arg Leu Leu Thr Lys Tyr Arg Pro Asn Ile Gln Val Gln Asp  
 290 295 300

Ile Ala Pro Ser Ile Gly Ile Lys Ile Lys Thr Leu Val Val Asp Arg  
 305 310 315 320

Lys Glu Ser Leu Val Met Glu Leu Ile His Ala Arg Glu Glu Val Ala  
 325 330 335

Thr Ala Ala Ile Gly Phe Ser Ile Tyr Ser Asn Ser Glu Pro Thr Val  
 340 345 350

Leu Ser Tyr Ser Ser Ile Phe Glu Val Leu Tyr Asp Gln Ser Val Leu  
355 360 365

Phe Gln Gln Leu Asp Gln Asn Asp Lys Val Lys Ser Glu Phe Ile Asn  
370 375 380

Val Ala Ala His Glu Leu Arg Thr Pro Ile Met Pro Ile Leu Asn Gly  
385 390 395 400

Val Glu Ile Leu Glu Glu Lys Leu Gly Glu Arg Lys Thr Glu Phe Gln  
405 410 415

Arg Glu Leu Asp Met Ile Thr Arg Asn Ala Ser Arg Leu Gln Asn Leu  
420 425 430

Ala Glu Ser Ile Leu Gln Val Ser Arg Ile Glu Ser Gly Ser Phe Ser  
435 440 445

Leu Asp Ile Gln Lys Asn Val Asp Ile His Asn Leu Ile Ser Gln Val  
450 455 460

Ile Glu Asp Ile Glu Lys Lys Tyr Ala Tyr Lys Glu Lys Ala Asn Lys  
465 470 475 480

Val Ala Ile Val Phe Leu Pro Ser Asp Gly Asn Arg Asn Gly Gly Tyr  
485 490 495

Ser Arg Gly Gly Gly Gly Ala Lys Ala Glu Gly Val Lys Ala Ala Ala  
500 505 510

Gly Ala Lys Gln Ala Gln Lys Glu Thr Gln Gln Lys Glu Gln Trp Val  
515 520 525

Glu Pro Val Asn Gly Pro Asn His Leu Leu Tyr Val Asp Cys Asp Pro  
530 535 540

Gln Lys Ile Ser Gln Val Val Phe Asn Leu Leu Asp Asn Ala Met Lys  
545 550 555 560

Phe Thr Asn Asp Gly Lys Ile Val Val Ser Thr Ala Val Met Gly Glu  
565 570 575

Ser Ser Pro Phe Thr Ser Thr Ser Gln Glu Ser Asp Thr Ser Asn Thr  
580 585 590

Ala Thr Ala Gly Lys Gly Asn Gly Gly Arg Val Asp Ser Ser Ser Asp  
595 600 605

Ser Asp Asn Gly Gly Gly Asp Asn Gly Gly Asp His Ile Gly Arg Gln  
610 615 620

Lys Glu Gly Ala Val Leu Val Thr Val Gln Asp Thr Gly Val Gly Leu  
625 630 635 640

Asn Ser Lys Ile Arg Asp Gln Leu Phe Gln Lys Phe Val Thr Lys Ser  
645 650 655

Asn Gln Gly Thr Gly Leu Gly Leu Tyr Leu Ser Arg Lys Ile Val Glu  
660 665 670

Glu His Gly Gly Lys Ile Trp Phe Glu Glu Thr Asn Ser Lys Gly Gly  
675 680 685

Asn Ser Ser Ser Arg Asn Asn Thr Lys Asp Lys Asp Glu Gly Ile Asp  
690 695 700

Glu Ile Leu His His Leu Gly Ser Glu Gly Lys Ile Gly Ala Thr Phe  
705 710 715 720

Lys Phe Val Ile Pro Val Ser Leu Pro Ser His Met Pro Thr Lys Asp  
725 730 735

Met Pro Glu Lys Asn Asp Glu Gly Lys  
740 745

<210> 32

<211> 519

<212> DNA

<213> Crenarchaeote

<400> 32

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gttgcatatg gtttaatttt ggatattttc gaaagcccaa tcacaagggt aaacggtaga 120

acaagtcact tgattattaa aatatatcca catatggata acaatacaag gatgagttct 180

ttagcaatcg agtttttttt atcccttttt tcaataacgt tacttttctaa aagaatatac 240

caaccagtga aatcaaagtc atatacctac catgacaagc atccatttca gtacaagatg 300

gaggattatg caaaccacaa caaaattgta gactataaaa actgcttact tttttttcaa 360  
gtatcgatgt tacaaaaaaa taaaataatt aggattcggg ttccagggtt gttttataca 420  
ggtggctgga tttccctcac actaaagttt ttgatatcca catcatttgc accatccac 480  
ctgaaagtag caatggggcc tcccaggat ataatctga 519

<210> 33

<211> 172

<212> PRT

<213> Crenarchaeote

<400> 33

Met Gln Ser Ser His Leu Ser Lys Ile Ile Thr Ile Cys Arg Met Pro  
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Ser Leu His Leu Val Ala Tyr Gly Leu Ile Leu Asp Ile Phe Glu Ser  
20 25 30

Pro Ile Thr Arg Leu Asn Gly Arg Thr Ser His Leu Ile Ile Lys Ile  
35 40 45

Tyr Pro His Met Asp Asn Asn Thr Arg Met Ser Ser Leu Ala Ile Glu  
50 55 60

Phe Phe Leu Ser Leu Phe Ser Ile Thr Leu Leu Ser Lys Arg Ile Tyr  
65 70 75 80

Gln Pro Val Lys Ser Lys Ser Tyr Thr Tyr His Asp Lys His Pro Phe  
85 90 95

Gln Tyr Lys Met Glu Asp Tyr Ala Asn His Asn Lys Ile Val Asp Tyr  
100 105 110

Lys Asn Cys Leu Leu Phe Phe Gln Val Ser Met Leu Gln Lys Asn Lys  
115 120 125

Ile Ile Arg Ile Arg Val Pro Gly Leu Phe Tyr Thr Gly Gly Trp Ile  
130 135 140

Ser Leu Thr Leu Lys Phe Leu Ile Ser Thr Ser Phe Ala Pro Ser His  
145 150 155 160

Leu Lys Val Ala Met Gly Pro Pro Gln Asp Ile Ile  
 165 170

<210> 34

<211> 1008

<212> DNA

<213> Crenarchaeote

<400> 34

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agaataacaa ccggtgctac ggatgcgact ggtgtcccat tggctgccga caaggatatgg      180
acgttctctg ttgcccttc tggaggcgga gggacattag accagtttgg gataaccag      240
atttaccctcg ataaggcggg tgggtggagaa aaatggttta tgaatatgca aaaccggaac      300
aatgatccac gaacaaaccc acctgacatg gacctaaacc cagatggcag ttggaacggt      360
aatgacgatc aggtcagata taacgtgttt acatcatcag ggtaccatcc agaggatatt      420
gagacttacg atcactcggg actcgcaaca caaggataca tgcagtatcc aaatgattgg      480
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tatgtgtttt caagcactac cacaccctca ccttcggcgt ctagttttga tagattcatt      720
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gaaatatggg tagacagaaa cccggatagc ccgactctga agaacaattg gcaaaaggta      840
tacacattca ctgactcagg tgggttttga aatgatgggt aagagtgtgg tggtgagccg      900
gatcagatta tctctgggg aggccccatt gctactttca ggtgggatgg tgcaaatgat      960
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<210> 35

<211> 335

<212> PRT

<213> Crenarchaeote

&lt;400&gt; 35

Thr Leu Leu Thr Ser Gly Gly Ala Pro Val Pro Ala Thr Val Ser Met  
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Asn Ser Pro Thr Asn Thr Val Ala Thr Leu Asn Pro Ser Ala Asp Leu  
20 25 30

Thr Pro Gly Ala Thr Tyr Thr Ala Arg Ile Thr Thr Gly Ala Thr Asp  
35 40 45

Ala Thr Gly Val Pro Leu Ala Ala Asp Lys Val Trp Thr Phe Ser Val  
50 55 60

Ala Pro Ser Gly Gly Gly Gly Thr Leu Asp Gln Phe Gly Ile Thr Gln  
65 70 75 80

Ile Tyr Pro Asp Lys Ala Gly Gly Gly Glu Lys Trp Phe Met Asn Met  
85 90 95

Gln Asn Pro Asn Asn Asp Pro Arg Thr Asn Pro Pro Asp Met Asp Leu  
100 105 110

Asn Pro Asp Gly Ser Trp Asn Val Asn Asp Asp Gln Val Arg Tyr Asn  
115 120 125

Val Phe Thr Ser Ser Gly Tyr His Pro Glu Asp Ile Glu Thr Tyr Asp  
130 135 140

His Ser Val Leu Ala Thr Gln Gly Tyr Met Gln Tyr Pro Asn Asp Trp  
145 150 155 160

Lys Asn Val Glu Met Thr Gly Ile Val Arg Val Asn Ser Gly Asp Asp  
165 170 175

Ser Glu Asn Phe Ala Trp Tyr Asp Arg Gly Gly Arg His Tyr Asp Gly  
180 185 190

Glu Gly Cys Glu Gly Ser Ala Tyr Lys Ala Asp Leu Phe Tyr Asp Gly  
195 200 205

Arg Val Arg Leu Ala Lys Glu Gln Trp His Val Ser Tyr Val Phe Ser  
210 215 220



Ser Thr Thr Thr Pro Ser Pro Ser Ala Ser Ser Phe Asp Arg Phe Ile  
225 230 235 240

Gly Phe Lys Ala Met Ile Tyr Asn His Gln Leu Ala Gly Gly Glu Thr  
245 250 255

Val Val Thr Thr Glu Ile Trp Val Asp Arg Asn Pro Asp Ser Pro Thr  
260 265 270

Leu Lys Asn Asn Trp Gln Lys Val Tyr Thr Phe Thr Asp Ser Gly Gly  
275 280 285

Phe Gly Asn Asp Gly Glu Glu Cys Gly Gly Glu Pro Asp Gln Ile Ile  
290 295 300

Ser Trp Gly Gly Pro Ile Ala Thr Phe Arg Trp Asp Gly Ala Asn Asp  
305 310 315 320

Val Asp Ile Lys Asn Phe Ser Val Arg Glu Ile Gln Pro Pro Val  
325 330 335